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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
KANG, DONGHEE	

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 03/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/934,334	BERGER ET AL.	
	Examiner	Art Unit	
	Donghee Kang	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 January 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *54-92* is/are pending in the application.

4a) Of the above claim(s) *56,57,67,68,73 and 83-85* is/are withdrawn from consideration.

5)☒ Claim(s) *55* is/are allowed.

6)☒ Claim(s) *54, 58-66, 69, 71, 74-82 and 83-92* is/are rejected.

7)☒ Claim(s) *70 and 72* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. Antecedent basis for the claimed subject matter in claim 13, in lines 5-6 is required, namely:

the phrase "the layers in the interband tunnel diode are grown in a chemical vapor deposition growth system"" which is not disclosed in the description section of the specification. The disclosure only discloses the source of programming energy is coupled to a diffused electrode.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims **54**, **58-60, & 62-63** are rejected under 35 U.S.C. 102(b) as being anticipated by Sweeny et al. (Mark Sweeny, "Resonant interband tunnel diodes", Appl. Phys. Lett., pp 546-548, 1989).

Re claim 54, Sweeny et al. teach a method of fabricating an interband tunnel diode, the method comprising the steps of (Fig.1):

layering a n–type bottom injector (I); layering a p-type top injector (IV) adjacent to the bottom injector; and layering a barrier material between the bottom injector and top injector. See pages 546.

Re claims 58 & 59, Sweeny et al. teach the layers in the interband tunnel diode are grown epitaxially, wherein the layers are semiconductor.

Re claim 60, Sweeny et al. teach the epitaxial layers comprised of a group IV alloy.

Re claims 62-63, Sweeny et al. teach the layers are grown in a molecular bean epitaxial growth system or chemical vapor deposition growth system.

4. Claims 71 & 86-88 are rejected under 35 U.S.C. 102(b) as being anticipated by Gennser et al. (Resonant tunneling of holes through silicon barriers, pp 210-213, J. Vac. Sci. Tech. B 8 (2), 1990).

Re claim 71, Gennser et al. teach a method of fabricating an interband tunneling diode comprising the step of lowering the substrate temperature before growth layers in the interband tunnel diode (See II. Experiment and Discussion).

Re claim 86, Gennser et al. teach the layers are grown epitaxially.

Re claims 87-88, Gennser et al. teach the substrate temperature is lowered at a temperature in the range of 0°C to 500°C.

5. Claims 74-78 are rejected under 35 U.S.C. 102(e) as being anticipated by Broekaert (US 6,218,677).

Re claims 74-75, Broekaert teaches a method of fabricating an interband tunnel diode by heat treating using ambient gas pressure during or after growth of the layers (Col.4, lines 41-67).

Re claims 76-78, Broekaert teaches heat treating the diode at a 700°C which is in the claimed ranges.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 64-66, 69, & 89-92 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sweeny et al. in view of Larsen et al. (Diffusion of Sb in relaxed SiGe, pp2684-2686, Appl.Phys.Lett. 68 (19), 5 May 1996).

Sweeny et al. do not explicitly teach heat treatment using an inert or reducing atmosphere or moreover a reduction in ambient gas pressure with various temperature and time. Larsen et al. teach heat treatment in a high flow furnace using an argon ambient with the temperature monitored as a function of time to obtain a precise temperature-time set. Temperature between 719 and 1028oC were used for time between 20 min and 24 h. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to select a proper temperature and time in order to obtain a high crystalline quality layers.

8. Claims 79-82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Broekaert in view of of Larsen et al. (Diffusion of Sb in relaxed SiGe, pp2684-2686, Appl.Phys.Lett. 68 (19), 5 May 1996).

Brokaert teach heat treating the diode but not times. Larsen et al. teach heat treatment between 20 min and 24 h. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the heating time in order a desired properties of the diode.

Allowable Subject Matter

9. Claim 55 is allowed.

Claims 70 & 72 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

10. Applicant's arguments filed 1-6-06 have been fully considered but they are not persuasive.

Applicant argues that Sweeny et al. do not teach the method of fabricating an interband tunnel diode as recited in the claim 54. This is not convincing. Although Sweeny does not using term "layering", Fig.1 clearly teach layering each layers.

Applicant argues that Gennser et al. does not teach a method of fabricating an interband tunnel diode. This is not convincing. Gennser clearly teaches a method of fabricating tunnel diode (See II. Experiment and discussion).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 571-272-1656. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Donghee Kang
Primary Examiner
Art Unit 2811

dhk